solenoid valves relative to other claimed aspects of the hydraulic brake device. In addition, Claims 1-3 recite that the first and second proportional solenoid valves control a differential pressure between the upstream hydraulic pressure and the downstream hydraulic pressure to a value corresponding to a control current applied to the first and second proportional solenoid valves so that control of the hydraulic pressure supplied to the wheel cylinders during automatic brake control is performed by operating the first proportional solenoid valve to increase the hydraulic pressure in the wheel cylinders and by operating the second proportional solenoid valve to decrease the hydraulic pressure in the wheel cylinders. Further, the independent claims recite that when the output hydraulic pressure of the pressure adjusting valve exceeds the hydraulic pressure in the wheel cylinders in response to operation of the brake operating member during automatic brake control, the output hydraulic pressure of the pressure adjusting valve is supplied into the wheel cylinders through the check valve.

As explained during the interview, the claimed hydraulic brake device at issue here has useful application in systems with automatic brake control such as car-to-car distance control, sometimes also referred to as adaptive cruise control. In such situations, it is desirable to control the hydraulic pressure supplied to the wheel cylinders. The first and second proportional solenoid valves operate to control the differential pressure between the upstream hydraulic pressure and the downstream hydraulic pressure to a value corresponding to a control current applied to the proportional solenoid valves. As set forth in the independent claims, and as discussed on page 17 of the present application, the control of the hydraulic pressure supplied to the wheel cylinders can be carried out by operating the first

proportional solenoid valve 21 to increase the hydraulic pressure in the wheel cylinders and by operating the second proportional solenoid valve 22 to decrease the hydraulic pressure in the wheel cylinders.

As also discussed in the present application and defined in the independent claims, if the brake operating member (e.g., brake pedal) is operated by the driver during automatic brake control when the hydraulic pressure supplied to the wheel cylinders is control by operation of the first and second proportional valves, if the output hydraulic pressure of the pressure adjusting valve 3 exceeds the hydraulic pressure in the wheel cylinders, the output hydraulic pressure of the pressure adjusting valve is supplied into the wheel cylinders through the check valve. It is thus possible to avoid sudden changes in vehicle deceleration, thus reducing sudden changes in deceleration when shifting from automatic brake control to normal braking.

The discussion during the interview focused on the rejection of the three independent claims based on the disclosure in U.S. Patent No. 6,078,858 to *Tozu et al.* in view of the disclosure in U.S. Patent No. 5,520,652 to *Peterson*. This rejection is based on the observation that it would have been obvious to replace *Tozu et al.'s* solenoid valves SA3, STR with proportional solenoid valves in view of the disclosure in *Peterson*.

As discussed during the interview, *Tozu et al.* discloses a vehicle motion control system for maintaining vehicle stability. The disclosed system includes the two solenoid valves SA3, STR. These solenoid valves SA3, STR are either energized or not, depending upon the operation state of the brake system. For example, when steering control by braking is executed irrespective of brake pedal

depression, the solenoid valve SA3 is operated or energized to be placed in its closed position while the solenoid valve STR is energized to be placed in its open position so that the power pressure produced by the auxiliary pressure source AP is discharged to the wheel brake cylinders.

Considering the purpose served by *Tozu et al.'s* solenoid valves SA3, STR, it would have not been obvious to replace such solenoid valves SA3, STR with proportional solenoid valves based on the disclosure in *Peterson*. First, the disclosure in *Peterson* specifically pertains to a pneumatic pressure delivery system used in surgical procedures. As discussed in the paragraph beginning near the bottom of at column 1 of *Peterson*, the pneumatic pressure delivery system is designed to deliver either negative pressure or positive pressure to achieve a precise, continuously variable and predictable control of the pressure delivered. Thus, the disclosure in *Peterson* does not relate to vehicle brake systems, and nowhere does *Peterson* disclose or suggest that the disclosure contained therein has useful application in vehicle brake systems. In addition, the solenoid valves SA3, STR in *Tozu et al.* are simply on-off solenoid valves which either permit or prevent flow, depending upon the operation state of the braking system. Thus, there exists no need for the continuously variable type of pressure control envisioned by *Peterson*.

As discussed during the interview, because the solenoid valves SA3, STR in *Tozu et al.* are intended to be either open or closed, there is no reason for replacing such solenoid valves with proportional solenoid valves that control a differential pressure between the upstream hydraulic pressure and the downstream hydraulic pressure. Indeed, as explained during the interview, there is continued pressure

from vehicle manufacturers to reduce the costs associated with components and systems used in vehicles. Proportional solenoid valves are significantly more expensive than the on-off solenoid valves SA3, STR disclosed in *Tozu et al.* The brake system disclosed in *Tozu et al.* operates as intended and desired through use of the on-off, 2-port 2-position solenoid valves SA3, STR. The system does not require, and would not benefit from utilizing, the more expensive proportional solenoid valves. Thus, in the face of continued pressure from vehicle manufacturers to reduce costs, there would be no reason to employ the more expensive proportional solenoid valves in *Tozu et al.'s* system. Simply stated, the use of proportional solenoid valves in *Tozu et al.* in place of the on-off solenoid valves SA3, STR would serve no useful purpose in the context of the intended operation of the brake system disclosed in *Tozu et al.* Indeed, such a modification would do nothing more than add cost to the expense of the disclosed system, a result contrary to the known objective of reducing costs to meet manufacturers demands. As explained above and during the interview, the hydraulic brake device at issue here utilizes proportional solenoid valves for purposes of achieving operational results different from those disclosed in *Tozu et al.* There is no disclosure or suggestion in *Tozu et al.* of trying to achieve operational results similar to those associated with the brake device at issue here (e.g., control of the hydraulic pressure supplied to the wheel cylinders during automatic brake control through operation of the first and second proportional solenoid valves as claimed).

As was also explained during the interview, the proportional solenoid valves at issue here are operated to control the hydraulic pressure supplied to the wheel solenoids, as set forth in the independent claims, by operating the first proportional

solenoid valve to increase the hydraulic pressure in the wheel cylinders and by operating the second proportional solenoid valve to decrease the hydraulic pressure in the wheel cylinders. The solenoid valves SA3, STR in *Tozu et al.* do not control the hydraulic pressure supplied to the wheel cylinders, but rather are merely opened or closed to deliver hydraulic pressure downstream from different sources, with hydraulic pressure in the wheel cylinders being increased, maintained or decreased through operation of the solenoid valves PC1-PC8.

Examiner Burch commented during the interview that *Peterson* recognizes that a proportional valve is more expensive than a two-way valve, but nevertheless chooses to utilize a proportional valve 788 in place of a two-way valve 778. However, as explained during the interview, there is a specific reason why *Peterson* proposes utilizing a more expensive proportional valve 788 in place of the two-way valve 778. As discussed beginning in line 32 of column 18 of *Peterson*, the two-way valve 778 is energized to increase the pressure at the pilot chamber port 46, and is de-energized to decrease the pressure at the pilot chamber port 46 so that the pressure at the pilot chamber port 46 constantly oscillates about a target pressure. Thus, as *Peterson* notes in lines 43-44 of column 19, the life of the two-way valve 778 is relatively short. This is because the two-way valve 778 is repeatedly energized and de-energized. As an alternative to the two-way valve 778, *Peterson* proposes use of the proportional valve 788. Though this valve is more expensive on a per unit basis compared to the two-way valve 778, the proportional valve 788 has a longer life than the two-way valve 778. Thus, *Peterson* justifies the higher initial costs associated with the proportional valve 788 based on the particular operational circumstances in which the valves 778, 788 are used.

Peterson's rational for utilizing the proportional valve in place of the two-way valve does not apply in the context of the brake system disclosed in *Tozu et al.* The solenoid valves SA3, STR disclosed in *Tozu et al.* are not repeatedly operated in the same manner as the two-way valve 778 described in *Peterson*. Consequently, *Peterson's* justification for using the more expensive proportional valve 788 in place of the two-way valve 778 does not apply to the solenoid valves SA3, STR in *Tozu et al.*

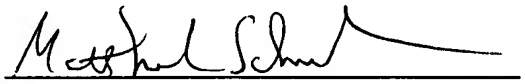
As a final point, Examiner Burch also noted during the interview that *Tozu et al.* discloses a proportioning valve PV. However, as explained during the interview, this proportioning valve PV merely proportions the amount of pressure supplied to the rear wheel cylinders versus the front wheel cylinders. This valve does not control a differential pressure between the upstream hydraulic pressure and the downstream hydraulic pressure to a value corresponding to a control current applied thereto. Further, there once again exists no reason to replace this proportioning valve PV, and the solenoid valves SA3, STR, with proportional solenoid valves as disclosed in *Peterson* because, as explained above, such a modification would serve no useful purpose in the context of the break system disclosed in *Tozu et al.* Further, there exists no justification for incurring the significant additional expense associated with using proportional solenoid valves in *Tozu et al.'s* system.

For at least the reasons discussed above, it is respectfully submitted that there exists no reason why a person of ordinary skill in the art would have combined the disclosures in *Tozu et al.* and *Peterson* in the manner recited in independent Claims 1-3 at issue here. Accordingly, withdraw of the rejection of record and allowance of this application are earnestly solicited.

Should any questions arise concerning this application, or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application, the undersigned respectfully requests that he be contacted at the telephone number indicated below.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: September 4, 2007 By: 

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